

PATENT SPECIFICATION

1,027,335

DRAWINGS ATTACHED.

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COMPLETE SPECIFICATION.

Improvements in Fluid Filters.

We, TECALEMIT (ENGINEERING) LIMITED, a British Company, of Plymouth, Devon, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to filters for filtering fluids, including particularly air or other gases, whilst it is also applicable to filters for liquids. It has amongst its objects the provision of improvements in such filters and it is particularly concerned with the selection and arrangement of the filter material or materials used.

According to the invention a filter element is provided comprising a support and one or more layers of filter material, wherein the one or at least of these layers is in the form of a sheet consisting of an intermingled coherent mass of fibres formed of a vinyl chloride-acrylonitrile copolymer.

It is preferred to form the filter element of at least two layers of filter material, one at least of which layers must be formed of fibres of such a vinyl chloride-acrylonitrile copolymer. Although it may be preferred to form the other layer or layers out of the same copolymer, this is not essential. It would, for example, be possible to use a foam material or fibres made of another synthetic plastics material for such other layer or layers.

As will be described in greater detail hereinafter the fibres of the vinyl chloride-acrylonitrile copolymer can be used in any desired thickness, while the thickness and density of the fibrous mass or sheet can be adjusted to suit particular requirements. The fibres may, if desired, be curled.

It has been found that fibres which are formed from a copolymer of vinyl chloride and an acrylonitrile, particularly when these

are formed into a sheet or layer of closely intermingled fibres, possess a number of advantages over other synthetic fibres which we have tested for use in the manufacture of fluid filters, especially in the case of air filters for internal combustion engines.

As the support for the filter material it is preferred to use sheet metal which has been formed with a number of openings through which the fluid being filtered passes, although the support may be made of materials other than metal and the metal or other material may be in the form of gauze or in other openwork form.

The support and the filter material are preferably arranged to form an annulus of cylindrical or other form, such that the fluid being filtered passes through the filter material either inwardly towards the centre of the annulus or outwardly away from the centre, as may be preferred. Such a filter element and its construction are more fully described and are claimed in our Application No. 5056/62 (1,027,333), to which reference may be made.

Further features of the present invention will become apparent from the following description of a preferred embodiment thereof. A filter element for use in the air filter for an internal combustion engine will be described although, as has been stated, the invention is applicable to filters for other gases and to filters for liquids.

Reference will be made to the accompanying drawing, the single figure of which is a vertical sectional view showing such a filter element.

The filter element comprises a support the construction of which is more fully described in the Specification and is shown in the drawings of our Application No. 5056/62 (1,027,333). This carries one or

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more layers of a fibrous filter material which will be described hereinafter, two such layers 2 and 3 being shown.

The support 1 is formed from a strip 4 of sheet steel or other metal which is stamped to form in it a series of elongated openings or slots 5. These extend transversely to the length of the strip and are designed to provide free passage for the air (or other fluid) which is being filtered.

At one of its ends the strip 4 is formed with a pair of projecting lugs 6, which are used for connecting the ends of the strip together when the latter is shaped to form the support 1. To do this the strip 4 is bent into the form of a cylinder, after which the lugs 6 are passed through the opening 5a nearest the other end of the strip 4 and are then folded back and pinched onto the end of the latter.

The support 1 may be left in the form of an open cylinder, but if it is desired to produce a shorter and flatter filter element, by reducing the axial length thereof, this may be done by applying pressure to the ends of the annular support 1 so as to force the central parts 7 of the strip 4 forming it inwardly towards the centre, or outwardly (as shown), the latter being preferred. This bending of the material of the support can be done at any stage during the production of the element, either before or after the attachment of the filter material and before or after the ends of the strip 4 have been fitted together. It is often preferred to do it after the side edges of the support have been bent over ready to receive the filter material (as will be described), but before they have been clamped onto the latter, and either before or after the support is formed into an annulus ready to receive the filter material.

In order to assist in the bending of the material of the support 1 the parts 7 of the latter between the openings 5 are preferably formed along the longitudinal centre line of the support with a series of arcuate depressions 8 which project from the support on the side to which the central parts of the latter will project. Thus, a preferred form of support which has been assembled into the form of an annulus ready for the fitting of the filter material may, when viewed in cross-section, have walls of generally "V" shape, the points of the "V" projecting outwardly and being of rounded shape, being formed by the arcuately-bent central parts 8 of the support.

Whether or not the parts 7 are deformed or bent as has been described and as is shown in the drawing, the upper and lower edges of the strip 4 are bent outwardly, as shown at 9, in order to form channels 10 which are adapted to receive the edges of the filter material 2 and 3. This may be done before or after the strip 4 is formed into an

annulus and before or after the bending of the parts 7, if this is done.

For effecting the filtration one or more sheets or layers of filter material is or are used, two being shown in the drawing. One at least of these layers consists of a mass of fibres which are formed of a copolymer of vinyl chloride and acrylonitrile and which are known under the name "Dynel-fibre."

"Dynel" is a Registered Trade Mark.

Such Dynel fibres, which are at present being manufactured in the United States of America, are imported into England by the Union Carbide Company of London and are formed into sheets by Johnsons Fabrics Ltd., of Earby, Colne, Lancashire.

A preferred material is one known as "Type 60 Natural 12 Denier Dynel 2½ staple fibre", which is made up into sheets ½ inch thick and weighing 8 ounces per square yard. One, two or more layers of this material may be used, depending on the size of the filter and its intended purpose. If necessary the density of the material can be varied by forcing a gas through it, while the fibres may be curled by a leaching process.

To form the filter element shown in the drawing, this filter material is cut into two strips the width of which is such that their edges will engage in the channels 10 with the two layers of filter material drawn over the parts 7 of the support 1 in the manner shown. The strips of filter material are of such a length that their ends abut against each other, or they may overlap.

The edges of the strips of filter material 2 and 3 may be attached to each other by the application of a suitable adhesive or by means of heat, the "Dynel" material being thermoplastic.

With the strips 2 and 3 of filter material in the positions shown in the drawing, the edge portions or lips 9 of the support 1 are pressed or crimped inwardly, by any suitable means, so as to secure the filter material in position.

Although the filter material has been described as being fitted to the support 1 after the latter has been brought into its finished form, apart from the pressing or crimping of the lips 9, this is not essential. The strip or strips of filter material could be fitted to the support strip 4 before the latter is brought into its annular form. To do this the upper and lower edges of the material of the strip 4 are first bent over so as to form channels (corresponding to the channels 10) for the edges of the filter material, after which one or more strips of the latter are laid along the strip 4, to which they are secured by pressing or crimping the edges of the latter.

The strip 4 is then bent round and its ends joined in the manner which has been described, the ends of the filter material prefer-

ably also being secured together by means of heat or using a suitable adhesive.

If the filter element is to be of the flattened form shown in the drawing the parts 7 are bent as has been described, which may be done before or after the fitting of the filter material and before or after the bending of the strip 4 into an annulus.

Although, in a filter element having two or more layers of filter material, it is possible and may be preferred to form all these layers of fibres of a vinyl chloride-acrylonitrile copolymer, this is not essential, providing that one at least of the layers is formed of this copolymer. Another layer or layers may be formed of a filter material of another kind, such as, for example, a foam material or another synthetic plastics material.

The invention is not limited to filter elements in which the filter material is arranged and supported in the manner which has been described and which is shown in the drawing. It is also applicable to filters having other types of support for the filter material.

WHAT WE CLAIM IS:—

1. A filter element comprising a support and one or more layers of filter material, wherein the or one at least of these layers is in the form of a sheet consisting of an intermingled coherent mass of fibres formed of a vinyl chloride-acrylonitrile copolymer.

2. A filter element according to Claim 1, wherein the element comprises at least two

layers of fibrous filter material, one of which layers is formed of the said copolymer and another of which layers is formed of another fibrous filter material.

3. A filter element according to Claim 1, wherein the element comprises at least two layers of filter material, one of which layers is formed of the said copolymer and another of which layers is formed of a foam filter material.

4. A filter element according to any of the preceding Claims, wherein the edges of the filter material are bonded together.

5. A filter element according to Claim 4, wherein the bonding is effected by means of an adhesive bonding agent.

6. A filter element according to Claim 4, wherein the bonding is effected by means of heat applied to the said edges to soften the material of the latter.

7. A filter element according to any of the preceding Claims, wherein the support is in the form of a sheet or layer of a material having openings through it for the free passage of the fluid being filtered.

8. A filter element according to any of the preceding claims wherein the fibres of the said copolymer are curled.

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COMPLETE SPECIFICATION

1 SHEET

*This drawing is a reproduction of
the Original on a reduced scale*

